TCS-7866/68
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MEMORANDUM FOR: Chief, Technical Activities Staff, T88G/NPIC

SUBJECT: KH-4B Camera System Choice of Stereo Convergence Angle

1. The knowledge that the PIM is considering changing the stereo convergency angle (defined as twice the pitch angle) of the KH-4B camera system from 30° to 20° carries with it certain implications about the accuracy and precision of dimensional intelligence and the image quality of the resulting system. Although NPIC was not specifically tasked to discuss this matter at the PIM meeting, it is nevertheless prudent to be prepared and to be aware of the consequences.

2. It has been shown by Aschenbrenner that:

$$Vy = \frac{V}{H} f \frac{1}{4} \sin 2w \sin 2\phi \left(1 - \frac{\tan \phi \tan B}{\cos w}\right)$$

where: Vy = image velocity in cross track direction
V = vehicle velocity (25,000 feet per second)
H = height (500,000 feet)
f = focal length (2 feet)
w = scan angle (varies from 0 degrees to 35°)
ϕ = pitch angle (10° or 15°)
B = variable pitch angle within field of view (varies from plus or minus 3°)

It can further be shown that the final term in parenthesis is for all practical purposes equal to unity. Table A and Graph A are comparisons of the resolution in the cross track direction at convergence angles of 20° and 30°.

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